

2)

$$i_D = I_s (e^{\frac{v_D}{\eta V_T}} - 1)$$

We calculated voltage values by using this formula:

$$V_D = -0.4 \rightarrow I_D = A$$

$$V_D = -0.2 \rightarrow I_D = 4.56 \cdot 10^{-19} \text{ A}$$

$$V_D = 0 \rightarrow I_D = 10^{-15} \text{ A}$$

$$V_D = 0.1 \rightarrow I_D = 4.68 \cdot 10^{-14} \text{ A}$$

$$V_D = 0.2 \rightarrow I_D = 2.19 \cdot 10^{-12} \text{ A}$$

$$V_D = 0.3 \rightarrow I_D = 1.02 \cdot 10^{-10} \text{ A}$$

$$V_D = 0.4 \rightarrow I_D = 4.80 \cdot 10^{-9} \text{ A}$$

$$V_D = 0.5 \rightarrow I_D = 2.24 \cdot 10^{-7} \text{ A}$$

$$V_D = 0.6 \rightarrow I_D = 1.05 \cdot 10^{-5} \text{ A}$$

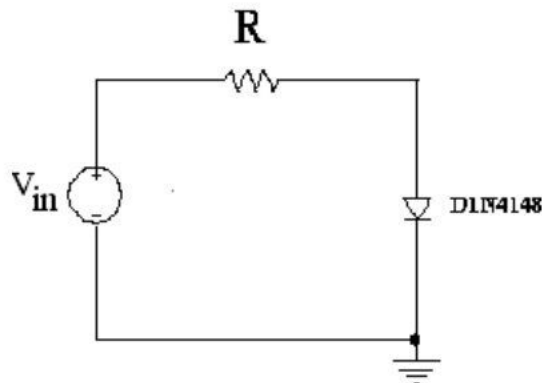
$$V_D = 0.65 \rightarrow I_D = 7.20 \cdot 10^{-5} \text{ A}$$

$$V_D = 0.7 \rightarrow I_D = 4.92 \cdot 10^{-4} \text{ A}$$

$$V_D = 0.75 \rightarrow I_D = 3.37 \cdot 10^{-3} \text{ A}$$

$$V_D = 0.8 \rightarrow I_D = 0.023 \text{ A}$$

$$V_D = 0.85 \rightarrow I_D = 0.1577 \text{ A}$$



The PSPICE output of the circuit is shown in figure 1.

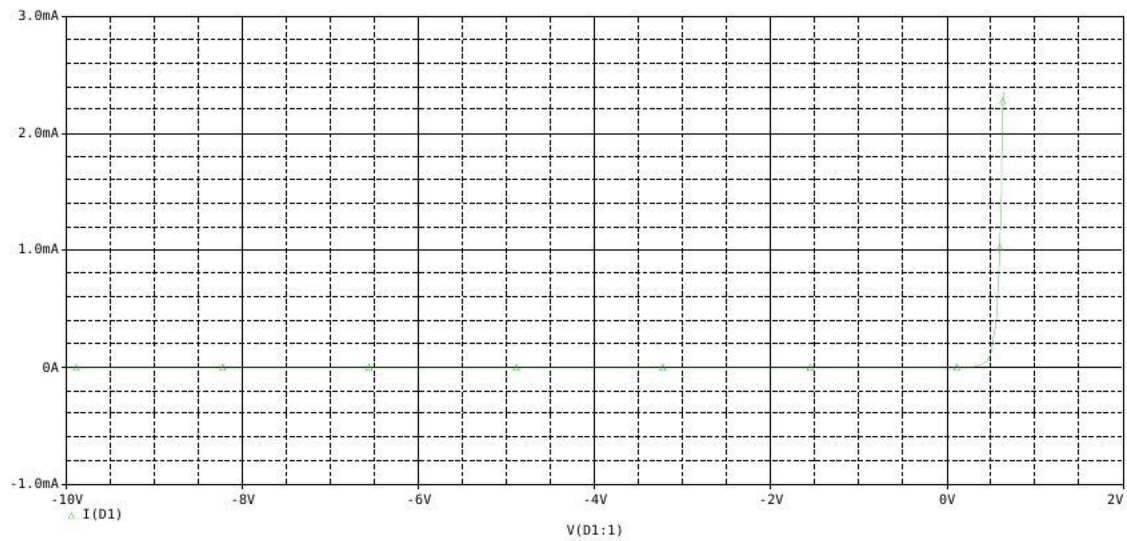


Figure 1

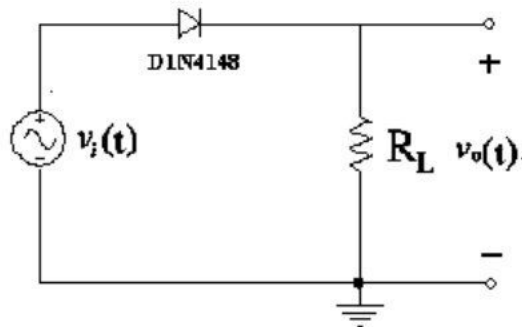
$$3) \quad r_f = \frac{\Delta V_{d1}}{\Delta I_{d1}} \quad r_r = \frac{\Delta V_{d2}}{\Delta I_{d2}}$$

We will find r_f and r_r .

$$\begin{aligned} \Delta V_{d1} &= 0.8 - 0.85 = 0.1 \quad \rightarrow \quad r_f = 0.1 / -0.134 = 0.746 \text{ ohm} \quad (-) \text{ Because of the} \\ \Delta I_{d1} &= 0.023 - 0.157 = -0.134 \quad \rightarrow \quad \text{current's direction.} \end{aligned}$$

$$\begin{aligned} \Delta V_{d1} &= 0 - (-0.4) = 0.4 \\ \Delta I_{d1} &= (10^{-15}) - (2.08 \cdot 10^{-22}) = 9.99 \cdot 10^{-16} \\ r_r &= 0.4 / 9.99 \cdot 10^{-16} = 4.0 \cdot 10^{14} \end{aligned}$$

4)



The PSPICE output of the circuit is shown in figure 2.

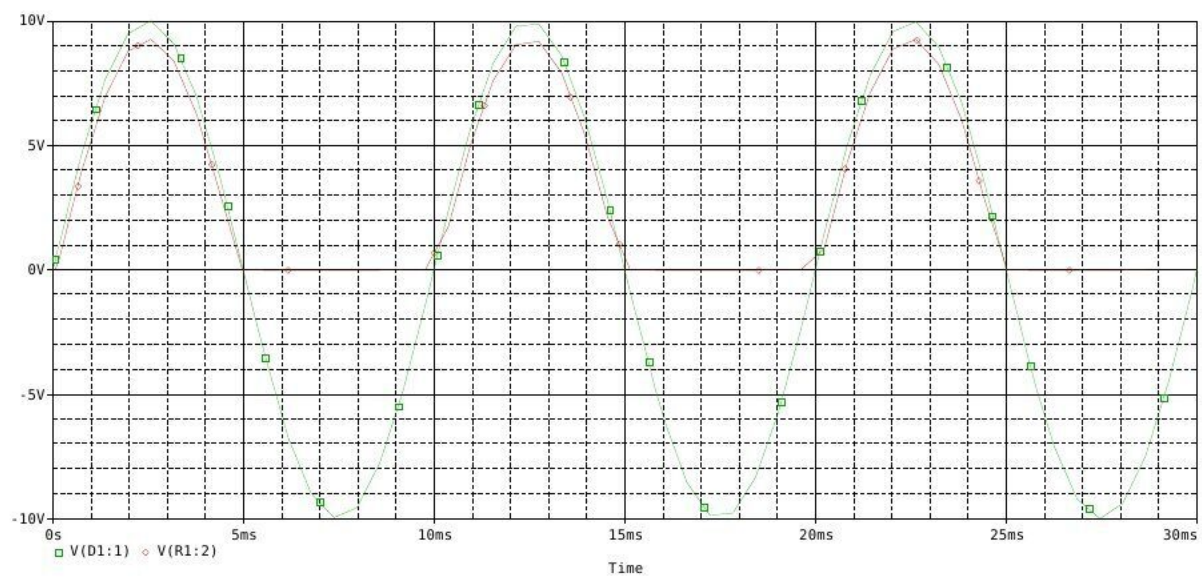


Figure 2



***BAŞKENT UNIVERSITY
ELECTRIC & ELECTRONICS ENGINEERING***

***EEM 214 ~ ELECTRONICS–I
LABORATORY
PRELIMINARY WORK***

Experiment Name : Diode Characteristics
Experiment Number : 2

Student Name : XXXXXXXXXX	
Student Number XXXXXXXXXX	
Section Number :	Experiment Day: